

TAXONOMIC NOTES ON DUTCH DESMIDS

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ABSTRACT - From the Netherlands four desmid taxa are newly described: *Cosmarium asterosporum* spec. nov., *C. sphyrelatum* spec. nov., *C. magnificum* Nordst. var. *minus* var. nov., *C. subprotumidum* Nordst. var. *pyramidale* var. nov., and *C. subbroomei* Schmidle forma *isthmochondrum* f. nov. Of eight taxa the names are newly given or recombined: *Cosmarium dickiei* nom. nov., *C. messikommeri* nom. nov., *C. contractum* Kirchn. var. *minutum* (Delp.) comb. nov., *C. margaritifera* Menegh. ex Ralfs var. *badense* (Schmidle) comb. nov., *C. subprotumidum* Nordst. var. *septentrionale* (Croasd.) comb. nov., *C. luxuriosum* (Kouwets) stat. nov., *C. notatum* (Grönbl.) stat. nov., and *C. sexnotatum* Gutw. var. *bipunctatum* (Wolosz.) stat. nov. The names *Cosmarium dilatatum* Järnefelt & Grönbl. and *C. subquadrans* W. & G.S. West var. *minor* Symoens are validated. Zygosporangia of *C. asterosporum*, *C. messikommeri*, and *C. notatum* are described for the first time.

RÉSUMÉ - Cinq nouveaux taxons appartenant à l'ordre des Desmiales sont décrits des Pays Bas: *Cosmarium asterosporum* spec. nov., *C. sphyrelatum* spec. nov., *C. magnificum* Nordst. var. *minus* var. nov., *C. subprotumidum* Nordst. var. *pyramidale* var. nov., et *C. subbroomei* Schmidle forma *isthmochondrum* f. nov. Pour huit taxons les noms sont donnés comme nouveaux ou bien ont fait l'objet d'une nouvelle combinaison: *Cosmarium dickiei* nom. nov., *C. messikommeri* nom. nov., *C. contractum* Kirchn. var. *minutum* (Delp.) comb. nov., *C. margaritifera* Menegh. ex Ralfs var. *badense* (Schmidle) comb. nov., *C. subprotumidum* Nordst. var. *septentrionale* (Croasd.) comb. nov., *C. luxuriosum* (Kouwets) stat. nov., *C. notatum* (Grönbl.) stat. nov. et *C. sexnotatum* Gutw. var. *bipunctatum* (Wolosz.) stat. nov. Les noms *Cosmarium dilatatum* Järnefelt & Grönbl. et *C. subquadrans* W. & G.S. West var. *minor* Symoens sont validés. Les zygosporangia de *C. asterosporum*, *C. messikommeri* et *C. notatum* sont décrites pour la première fois.

KEY WORDS : taxonomy, desmids, *Cosmarium*, zygosporangia, The Netherlands.

Preparing the fourth part of a Dutch desmid flora dealing with the genus *Cosmarium*, some taxonomic revisions appeared desirable. Most of the algal material was studied in fixed condition (formaldehyde). Some samples collected by the late Prof. J. Heimans in the first half of this century contain taxa that most probably are extinct in The Netherlands nowadays.

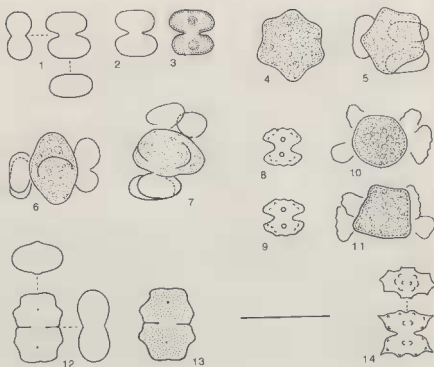


Plate 1 - Figs. 1-7: *Cosmarium asterosporum* spec. nov. Figs. 8-11: *C. messikommeri* nom. nov. Figs. 12, 13: *C. sphyrelatum* spec. nov. Fig. 14: *C. dilatatum* Järfelt & Grönl. ex Coesel. Scale bar = 20µm.

***Cosmarium asterosporum* spec. nov. (Pl. 1, figs. 1-7)**

Cellulae fronte conspectae longitudine latitudinem fere aequante aut paulum superante media parte fortiter constrictae cum sino ex intimo angusto et rotundato foras dilatante. Semicellulae fronte, latere et apice conspectae ordinatim subovatae, subcirculares et ovatae aut oblongae sunt. Paries cellularum laevis est.

Zygosporae compressae sed verum fronte conspectae quinque- vel sexangulatae lateribus inter angulos late rotundatos profunde excavatis figuram stellae informis habentes.

Longitudo cellularum 10-11µm, latitudo 9.5-10.5µm, crassitudo 5.0-5.5µm.

Diametrum zygosporarum 15-17µm, crassitudo 9.5-11.0µm.

Holotypus: Tabl. 1, fig. 1.

Cells in frontal view about as long as broad, or slightly longer, with a deep median constriction, the sinus widening from its narrow, rounded interior part.

Semicells in frontal view sub-oval, in lateral view subcircular, in apical view oval. Cell wall smooth. Zygosporangia compressed, in frontal view stellate, 5-6-angular, the sides deeply concave between broadly rounded angles. Cell length 10-11 μm , width 9.5-10.5 μm , thickness 5.0-5.5 μm . Diameter zygosporangia 15-17 μm , thickness 9.5-11 μm .

Vegetative cells of *C. asterosporum* may be easily confused with those of some other small-sized *Cosmarium* species, like *C. bioculatum* (Bréb.) ex Ralfs and *C. tenue* Archer. However, the shape of its zygosporangia is very characteristic, as far as known not resembling that of any other representative of this genus.

C. asterosporum abounded in a periphyton sample from a mesotrophic, slightly acid heathland pool at Staverden, collected in August 1985. The richly sporulating material could be studied alive.

***Cosmarium contractum* Kirchn. var. *minutum* (Delp.) comb. nov.**
(Pl. 2, fig. 4)

Basionym: *C. minutum* Delp. (Delponte, 1878, p. 9, pl. 7, figs 37-39).

Synonym: *C. contractum* Kirchn. var. *ellipsoideum* (Elfv.) W. & G.S. West forma 1 (West & West, 1905, p. 173, pl. 61, figs 30-32).

In desmid literature (see e.g. Förster, 1982, p. 185) this taxon is commonly known as *C. contractum* var. *minutum* (Delp.) W. & G.S. West. However, although West & West (1905, p. 173) suggest this form of *C. contractum* to be identical with *C. minutum* Delp. and consequently to place it as *C. contractum* var. *minutum* they themselves formally assigned it to *C. contractum* var. *ellipsoideum* (Elfv.) W. & G.S. West. In consequence, the name *C. contractum* var. *minutum* (Delp.) W. & G.S. West is not valid.

In The Netherlands *C. contractum* var. *minutum* is known of oligo-mesotrophic, acid heathland pools.

***Cosmarium dickiei* nom. nov. (Pl. 2, figs 7-8)**

Synonym: *C. blyttii* Wille var. *bipunctatum* (Dick) Ruz. (Ruzicka, 1972, p. 465, pl. 61, figs 18-19).

This characteristic form - according to Ruzicka (l.c.) widely distributed in Europe - in my opinion is not related to *C. blyttii* which has smaller dimensions, a higher length/width ratio, and more pronounced crenations at the lateral margins.

In the Netherlands, *C. dickiei* is not seldom on pH-circumneutral peat pits and fen hollows while *C. blyttii* seems to be limited to oligotrophic, acid bogs and heathland pools.

***Cosmarium dilatatum* Järnefelt & Grönbl. ex Coesel (Pl. 1, fig. 14)**

Lectotype: Pl. 1, figs 1-3 in Järnefelt & Grönblad (1960).

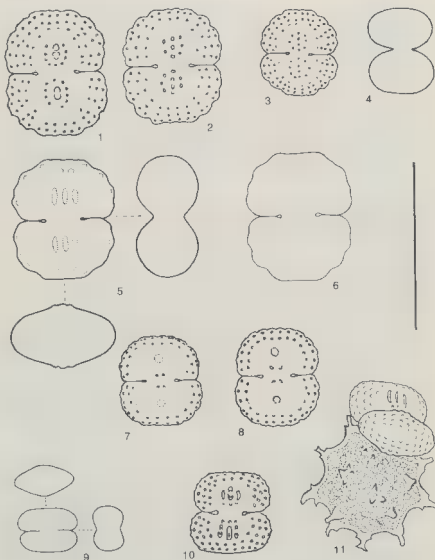


Plate 2 - Figs. 1-2: *Cosmarium subprotumidum* Nordst. var. *septentrionale* (Croasd.) comb. nov. Fig. 3: *C. subprotumidum* Nordst. var. *pyramidale* var. nov. Fig. 4: *C. contractum* Kirchn. var. *minutum* comb. nov. Figs. 5-6: *C. sexnotatum* Gutw. var. *bipunctatum* (Wolosz.) stat. nov. Figs. 7, 8: *C. dickiei* nom. nov. - Fig. 9: *C. subquadrans* W. et G.S. West var. *minor* Symocns ex Coesel. - Figs. 10, 11: *C. notatum* (Grönl.) stat. nov. Scale bar = 50µm.

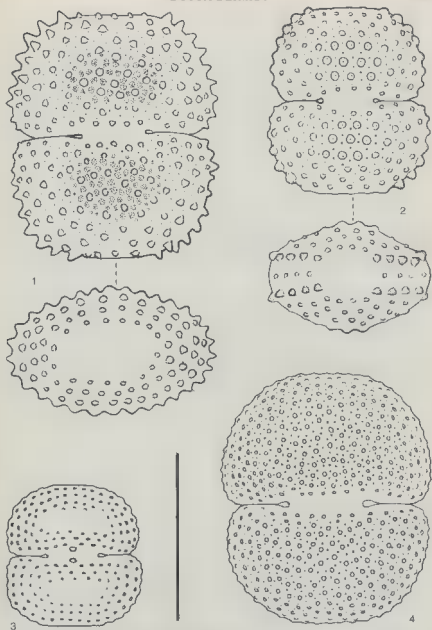


Plate 3 - Fig. 1: *Cosmarium margaritifera* Menegh. ex Ralfs var. *badense* (Schmidle) comb. nov. Fig. 2: *C. luxuriosum* (Kouwets) stat. nov. Fig. 3: *C. subbroomsi* Schmidle forma *isthmochondrum* f. nov. Fig. 4: *C. magnificum* Nordst. var. *minus* var. nov. Scale bar = 50 μ m.

This small-sized, remarkable desmid form - somewhat intermediate between the genera *Cosmarium* and *Euastrum* - was figured by Beijerinck (1926, p. 56, pl. 8, figs 149-151) under the name *C. dilatatum*, referring to Lütkenmüller's manuscript for Pascher's "Susswasserflora, Heft 8". However, the manuscript in question was not published and it was not until 1960 that Lütkenmüller's diagnosis of *C. dilatatum* was used by Järnefelt & Grönblad (1960), p. 150-151 in a formal description of this species. Unfortunately, last mentioned authors did not indicate a nomenclatural type, so formally the name *C. dilatatum* was not validly published (Art. 37.1 I.C.B.N.). By indication of a lectotype now the name in question has been validated.

Beijerinck (l.c.) encountered *C. dilatatum* in high cell numbers in the plankton of the mesotrophic Dutch lake Hijkemeer. Rather recently (1980) it appeared to occur abundantly in the plankton of the eutrophied lake Uddelermeer (like lake Hijkemeer situated in the eastern Netherlands). Remarkably, both the material from Hijkemeer and that from Uddelermeer (figured in our Plate 1: 14) show a doubled central protrusion per semicell, while Lütkenmüller's and also Järnefelt's material are characterized by a single one.

***Cosmarium luxuriosum* (Kouwets) stat. nov. (Pl. 3, fig. 2).**

Basionym: *C. margaritifera* Menegh. ex Ralfs forma *luxuriosum* Kouw. (Kouwets, 1988, p. 71, pl. 6, figs 1-5).

The marked rows of big, brownish coloured granules at the apical angles of the semicells render this taxon such a characteristic habit that it can easily be distinguished from *C. margaritifera*. Actually, by previous investigators the algal form under discussion was related to several other species, like *C. praemorsum* Bréb., *C. ungerianum* (Näg.) De Bary, and *C. oligogongrus* Reinsch (Kouwets, 1988).

In the Netherlands *C. luxuriosum* is only known from a ditch at Winterswijk, sampled by Prof. Heimans in 1916.

***Cosmarium magnificum* Nordst. var. *minus* var. nov. (Pl. 3, fig. 4)**

Dimensionibus minoribus a varietate nominata differt. Longitudo 70-74 µm, latitudo 59-61 µm.

Holotypus: Tab. 3, fig. 4.

Differs from nominal variety by smaller dimensions.

In a previous paper this form was labeled as *C. controversum* W. & G.S. West (Coesel, 1979, p. 386, pl. 16, fig. 2). Both *C. controversum* and *C. magnificum* are characterized by marked scrobiculations (pore fields sensu Neuhäus & Kiermayer, 1982) which are regularly arranged around the granules in the central area of the semicells. In its cell shape our alga agrees with *C. magnificum* rather than with *C. controversum*, that has a more pyramidal outline of the semicell. However, dimensions are considerably smaller (see above) than those stated for *C. magnificum* so far (i.e. length > 100 µm, width > 80 µm, see also Grönblad, 1921, p. 31, pl. 6, figs 40-42).

In The Netherlands *C. magnificum* var. *minus* is a very rare taxon in mesotrophic, slightly acid fen hollows.

Cosmarium margaritiferum Menegh. ex Ralfs var. *badense* (Schmidle) comb. nov. (Pl. 3, fig. 1).

Basionym: *C. subtholiforme* Racib. var. *badense* Schmidle (Schmidle, 1894, p. 58, pl. 7, fig. 21).

Synonym: *C. malinvernianum* (Racib.) Schmidle var. *badense* Schmidle (Schmidle, l.c.).

The discussion on this algal form in Schmidle (l.c.) is rather confusing. The author describes the taxon *badense* formally as a variety of *C. subtholiforme* Racib. referring to a relationship with *C. subtholiforme* var. *malinvernianum* Racib. At the same time he argues that last mentioned variety better could be raised in rank to species level, in that case including Schmidle's form as var. *badense*. What is a mere suggestion in the text appears already realized in the legends of his plate 7, fig. 21 being named as *C. malinvernianum* var. *badense*!

Unfortunately, the nominal variety of *C. malinvernianum* is a poorly known taxon. With respect to var. *badense* I tend to agree with West & West (1908, p. 202) in considering it related to *C. margaritiferum* Menegh. ex Ralfs. Both taxa are marked by a regular pattern of six variably sized, more or less triangular scrobicles around each granule in the centre of the semicells. However, the overall larger dimensions and especially the conspicuous conical granules on the lateral margins render the algal form under discussion such a characteristic habit that it can distinguished as a separate variety.

In The Netherlands *C. margaritiferum* var. *badense* is a rare taxon, known from mesotrophic, slightly acid fen hollows.

Cosmarium messikommeri nom. nov. (Pl. 1, figs 8-11; Pl. 4, figs 3-4).

Synonym: *C. cymatonophorum* W. West forma *ornata* Messik. (Messikommer, 1927, p. 101, pl. 4, fig. 12).

One of the differentiating characteristics of this taxon concerns the broadly rounded apical corners of the semicells. By this it is such distinct from the nominal variety of *C. cymatonophorum* that, in my opinion, raising in rank to species level is justified.

Apparently, *C. messikommeri* is a rare taxon. In The Netherlands it is only known from a ditch at Maarsbergen where it was encountered in conjugating condition by Prof. Heimans in 1916. The zygospores are angular-globose to polyhedral in shape, 11-15 µm in diameter (Pl. 1, figs 10-11).

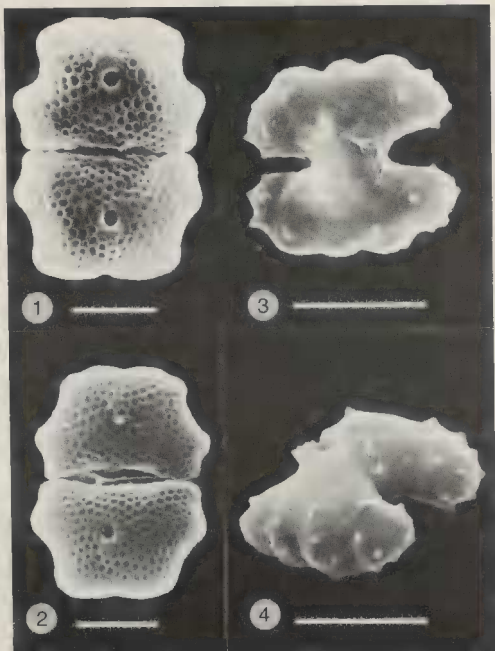


Plate 4 - SEM micrographs. Figs. 1-2: *Cosmarium sphyrelatum* spec. nov. Figs 3-4: *C. messikommeri* nom. nov. Scale bar = 5µm.

Cosmarium notatum (Grönbl.) stat. nov. (Pl. 2, figs 10-11)

Basionym: *C. arnellii* Boldt var. *notatum* Grönbl. (Grönblad, 1956, p. 26, pl. 7, figs 77-78).

Synonym: *C. jenisejense* Boldt var. *notatum* (Grönbl.) Först. forma (Förster, 1965, pl. 6, fig. 9).

The algal form figured in our Plate 2: 10 very closely resembles *C. jenisejense* var. *notatum* forma Förster (1965). Last mentioned author suggests var. *notatum* to be related to *C. jenisejense* rather than to *C. arnellii*. However, the pattern of three vertical series of each three granules (often partly fused into elongate warts) characteristic of var. *notatum*, is absent in both *C. arnellii* and *C. jenisejense*. Therefore I prefer to consider it a separate species.

In The Netherlands *C. notatum* is only known from a ditch near the rivulet Dinkel, sampled by Prof. Heimans in 1916. Part of the material was in sporulating condition (Pl. 2, fig. 11). Zygospores are globose, furnished with single or bifurcate spines, the conical base of which is supplied with some prominent teeth. Diameter without spines ca. 30 µm, with spines ca. 40 µm.

Cosmarium sexnotatum Gutw. var. *bipunctatum* (Wolosz.) stat. nov. (Pl. 2, figs 5-6)

Basionym: *C. sexnotatum* Gutw. forma *bipunctata* Wolosz. (Woloszynska, 1952, p. 20, pl. 11, fig. 137).

In a previous paper (Coesel, 1979, p. 389, pl. 15, figs 16-18) this algal form was labelled as *C. orthogonum* Delp. var. *gutwinskii* Krieg. & Gerl. forma. At first sight the cells seem to be smooth-walled (cf. Pl. 2:6) but, when more closely examined, at least in part of the material the delicate wall sculpturing characteristic of Woloszynska's taxon can be distinguished. The taxon in question differs from typical *C. sexnotatum* not only by its deviating, often strongly reduced wall sculpturing but also by its distinctly larger dimensions, i.e. length 32-39 µm, width 25-32 µm, thickness 17-19 µm. So in my opinion it can be better raised to variety rank. Most probably also *C. sexnotatum* fa?, figured in mere outline by Behre (1939, p. 80, pl. 2, fig. 12) may be accounted to this variety.

In the Netherlands *C. sexnotatum* var. *bipunctatum* is rather widely distributed in mesotrophic, slightly acid fen hollows.

Cosmarium sphyrelatum spec. nov. (Pl. 1, figs 12-13, Pl. 4, figs 1-2)

Cellulae ratione longitudinis pro latitudine 1.2 - 1.4 circumscriptionem subrectangularem atque sinum profundum et clausum fronte conspectae habent. Semi-cellulae hexagonales partibus inferioribus marginum lateralium brevioribus quam partibus superioribus. Ambae partes marginum lateralium, tam pars inferior et divergens quam pars superior et convergens, concavae sunt. Apice late truncato media pars leviter retusa est.

Semicellulae latere conspectae late ellipticae, plerumque utrobique tuberculo mediano distincto instructae.

Paries cellularum ope microscopii electronici verrentis visus valde scrobiculatus, saepe media regione semicellularum scrobiculo maiore plerumque continuo cum incrassatione locali tuberculari minutus.

Longitudo 13-17µm, latitudo 11-14µm, crassitudo 8-10µm.

Holotypus: Tab. 1, fig. 12.

Cells in frontal view subrectangular in outline, 1.2-1.4 times longer than broad, with a deep, closed sinus. Semicells hexagonal, the lower parts of the lateral margins shorter than the upper parts. Both lower, divergent and upper, convergent parts of the lateral margins concave. Apex broadly truncate with a slight median notch. Semicells in lateral view broadly elliptic, in apical view elliptic, usually with a distinct median tubercle on either side.

Cell wall under scanning electron microscope markedly scrobiculated, often with an extra large scrobicle in the midregion of the semicell, usually combined with a local tubercular thickening. Cell length 13-17µm, width 11-14µm, thickness 8-10µm. Holotype: Pl. 1, fig. 12.

In a previous paper (Coesel, 1984) this algal form was associated with *C. regnellii* Wille var. *chondrophorum* Skuja as figured by Förster (1965, pl. 5, fig. 31). However, since Förster's figure does not agree with the original drawing of this taxon in Skuja (1949, p. 139, pl. 29, fig. 4) at the time identification remained problematic.

A somewhat better option for identification seems to be *Cosmarium venustum* (Bréb.) Archer var. *induratum* Nordst., described from New Zealand (Nordstedt, 1888, p. 57, pl. 3, fig. 13). Considering the cell shape in Nordstedt's original drawing, it is clear that this taxon has but little to do with *C. venustum*. An eventual raise in rank to species level would result in a homonym (*C. induratum* Gutw. 1890). So, even if our alga would belong to the same species as *C. venustum* var. *induratum* it had to be described under a new species name (assuming that it can not be assigned to another described species).

In The Netherlands *C. sphyrelatum* is a rather common taxon in the benthos of mesotrophic, slightly acid fen hollows.

Cosmarium subbroomei Schmidle forma *isthmochondrum* fa. nov. (Pl. 3, fig. 3).

Synonym: *C. subbroomei* Schmidle forma Woloszynska (1950, p. 44, pl. 15, figs 165-166).

Verrucula quodam modo conoidea proxima isthmo a forma nominata differt.
Holotypus: Tab. 3, fig. 3.

C. subbroomei forma *isthmochondrum* is distinguished from the nominal form by a distinct supra-isthmial granule. In the Netherlands this taxon is rather rare in mesotrophic, pH-circumneutral fen hollows and peat pits.

***Cosmarium subprotumidum* Nordst. var. *pyramidale* var. nov. (Pl. 2, fig. 3)**

Circumscriptione semicellularum magis pyramidalia a varietate nominata differt. Latitudo apicis minor quam dimidia pars latitudinis maximae semicellularum est. Longitudo 23-26 µm, latitudo 21-24 µm. Holotypus: Tab. 2, fig. 3.

C. subprotumidum var. *pyramidale* differs from the nominal variety by a more pyramidal outline of the semicell, with lateral margins briefly diverging from the base, then strongly converging to the truncate apex. Apex less than half ■ wide as greatest width of semicell.

In The Netherlands *C. subprotumidum* var. *pyramidale* is locally common in the tychoplankton of mesotrophic peat pools. Although often co-occurring with the nominal variety of *C. subprotumidum*, no transitional forms have been found.

***Cosmarium subprotumidum* Nordst. var. *septentrionale* (Croasdale) comb. nov. (Pl. 2, figs. 1-2)**

Basionym: *C. septentrionale* Croasdale (Croasdale, 1973, p. 10, pl. 15, figs 7-9).

Croasdale (l.c.) compares her newly described species with *C. subcostatum* Nordst., but in my opinion - owing to e. g. its produced apex and single pyrenoid - it has to be related to *C. subprotumidum* rather than to *C. subcostatum*.

In The Netherlands *C. subprotumidum* var. *septentrionale* is widely distributed in benthos and tychoplankton of mesotrophic pools.

***Cosmarium subquadrans* W. & G.S. West var. *minor* Symoens ex Coesel (Pl. 2, fig. 9).**

Lectotype: Pl. 5, figs 5-6 in Symoens (1960).

Although there can hardly be any misunderstanding that Symoens (l.c.) intended his figs 5 and 6 (rendering a frontal and an apical view respectively) as iconotype, he did not mention it explicitly. So the name of the variety in question has to be validated.

So far, in The Netherlands *C. subquadrans* var. *minor* was only found at one locality, i.e. a dystrophic pool at Brunssum (1982).

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